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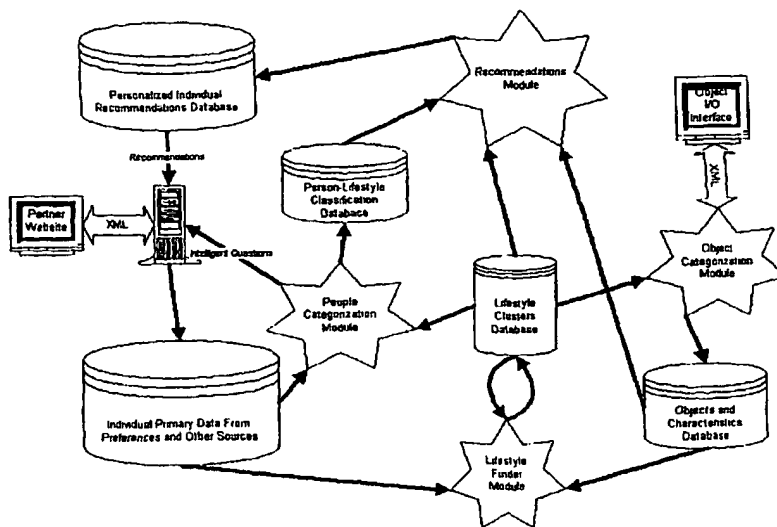
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**(54) Title:** SYSTEM AND METHOD FOR PROVIDING PERSONALIZED RECOMMENDATIONS



**(57) Abstract:** A system and method of providing personalized recommendations. The system defines objects, such as common areas of interests. These objects can be such areas of interest as movies, restaurants, clothes, geography, hobbies, sports, etc. Each object has a set of properties that define the objects. For example, a Movie object may have such properties as genre, director, actors, etc. Each object can then be grouped into a cluster based on commonality of properties of objects that are closely related by different users. For example, if a number of users have similar properties on a particular object, then other objects are examined as to whether their properties are also similar. An example might be that if a number of users have similar properties on a particular style of music, then their preferences on movies, clothing, hobbies, etc. may also be similar. If these conditions are met, then a "cluster" of those objects and users is formed. Recommendations based on the choices and recommendations from other users within a cluster may then be forwarded to the user.

**WO 02/01419 A1**

## SYSTEM AND METHOD FOR PROVIDING PERSONALIZED RECOMMENDATIONS

**Related Applications:** This application claims the benefit of provisional  
5 patent application 60/214,871, filed on June 28, 2000.

**Field of the Invention:** This invention relates to the field of personalized  
portals and for providing personalized recommendations to users.

### 10 Background of the Invention

Recently, the use of collaborative filtering systems have become prevalent  
for recommending purchases to users. Prior collaborative filtering systems  
typically associate the preferences of individual users with other users that have  
perceived common preferences. The individual user is then provided with  
15 recommendations based on the preferences of the other users associated with the  
individual user. Examples of this include recommendations, such as books,  
based on books purchased by other users who have purchased similar books as  
the individual user. However, this type of collaborative filtering have been  
limited to individual websites or merchants. Further, the information collected  
20 about the individual user is based on the purchases at that website, or on  
“cookies” retrieved that may indicate other sites visited by the user. This  
information is used only by the publisher of that website.

Users, however, have complex interests and preferences that range far  
beyond the information that can be gained by purchases at a single website or  
25 visits to various websites. The prior collaborative filtering systems are not able to  
analyze the true interests and preferences of the user and provide  
recommendations based on these complex interests and preferences of the user.  
Also, some of the existing collaborative filtering systems provide  
recommendations based on “ratings” from other users in the associated groups.  
30 However, these ratings are based on the recommendations of other users in the  
group to which the individual user has been “assigned”. Thus, these

recommendations are of limited use depending on whether the user truly has similar interests and preferences as other associated users.

Another feature presently common on the World Wide Web is the use of portals to attract users. Information gathering on the World Wide Web can be daunting due to the vast amount of unorganized information available. Portals are commonly used to attract users to such information in a convenient format. Common portals are typically search engines, or to content that is easily accessible to the site. Advertising is then provided at the portal in the form of banner ads or other types of advertising. Often the advertising is targeted to groups of users based on information obtained through the collaborative filtering mechanisms. However, this information and subsequent targeting of advertising is limited to the relatively crude information obtained about the associated group or "cluster" of users based on common purchasing history of the users, or visits to similar sites. Thus, the advertiser may not be reaching the desired demographic for their products and services.

Another problem with information gathering on the World Wide Web is the need to access multiple sites. Many of the sites require the user to log on to the site. Also, each site may have a different privacy policy. Thus, the user has to log on multiple times in a typical session, and will not necessarily review each privacy policy on each site.

There is presently a need for a system that eliminates or minimizes the above problems. The present invention provides systems and methods for doing so.

### **Summary of the Invention**

The present invention provides a system and method for providing personalized recommendations. In a preferred embodiment, the present invention associates users sorted by their personal interests into clusters, and then provides recommendations based on the interests and recommendations of other users associated within the same cluster.

In a preferred embodiment, the system defines objects, such as common areas of interests. These objects can be such areas of interests as movies, restaurants, clothes, geography, hobbies, sports, etc. Each object has a set of

properties that define the objects. For example, a Movie object may have such properties as genre, director, actors, etc. Each object can then be grouped into a cluster, such as a Lifestyle based on commonality of properties of objects that are closely related by different users. For example, if a number of users have similar properties on a particular object, then other objects are examined as to whether their properties are also similar. An example might be that if a number of users have similar properties on a particular style of music, then their preferences on movies, clothing, hobbies, etc. may also be similar. If these conditions are met, then a "cluster" of those objects and users is formed. Recommendations based on the choices and recommendations from other users within a cluster may then be forwarded to the user.

The clusters can be constantly reviewed as to their relevance overall and to a particular user. The users can rate their recommendations which will then be used to improve the cluster's relevance.

User's may belong to more than one cluster, depending on their interests. Also, the clusters can be "rated" as to how similar their object properties are to one another. This rating can then be applied to weight the recommendation made to a user.

In a preferred embodiment, the system is accessed through a portal, such as on the World Wide Web or other network. The portal can be entered by a user identification and password. Advertising can be displayed on the portal based on the interests of a particular user. Also, associated websites can be linked to allow entry to multiple websites through a single portal.

These and other features of the present invention will be evident from the ensuing detailed description of preferred embodiments, from the claims and from the drawings.

**BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 is a schematic illustration the overall system configuration.

5        Figure 2 is a schematic illustration of the architecture of the lifestyle system.

Figure 3 is a screen shot of the log-in screen of an embodiment of the system of Figure 2.

Figure 4 is a screen shot of the selection menu of the lifestyle system.

Figure 5 is a screen shot of the Movie menu of the system of Figure 3.

10        Figure 6 is a screen shot of the ratings menu of the system of Figure 5.

Figure 7 is a screen shot of the Options menu of the system of Figure 3.

Figure 8 is a screen shot of the Objects menu of the system of Figure 3.

Figure 9 is a screen shot of the Lifestyles menu of the system of Figure 3.

## DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

5 The present invention provides systems and methods for providing a personalized portal and improved, concept based lifestyle clustering of users to provide information to users.

10 It is to be expressly understood that the descriptive embodiments set forth herein are intended for explanatory purposes and is not intended to unduly limit the scope of the claimed inventions. Other embodiments and applications not described herein are considered to be within the scope of the claimed inventions.

### System Overview

15 In the preferred embodiment, the system of the present invention provides multiple benefits to users and to content publishers through a network, such as the global network, commonly referred to as the Internet and the World Wide Web and to advertisers. The system of the preferred embodiment provides recommendations to a user based on preferences obtained by associating users with lifestyle preferences. The content publishers, such as merchants, are provided with truly targeted advertising based on the user preferences. This targeted advertising is targeted to individual users that are highly likely to be receptive to such advertising.

20 The system of the preferred embodiment of the present invention provides an intelligent collaborative filtering system that "clusters" or associates users based on a wide range of preferences and interests of the users. This system is able to continually refine and improve these clusters until a stable configuration of a cluster is achieved. The user is then able to obtain recommendations from this cluster of similar users that are truly useful. Additionally, advertising can be targeted to this cluster of users with similar interests and preferences that is likely to be desirable.

25 The system of the preferred embodiment of the present invention also provides a portal networked to one or more associated websites or "partners". The portal enables a user to log in a single time to gain access to multiple websites. Thus, a user is not required to log in multiple times, for each website



visited. Also, the user is assured of a common policy for privacy concerns. Presently, each website maintains individual privacy policies for use of information collected by the website. The present invention provides a common policy for all associated websites.

5           The portal of the preferred embodiment also provides personalized services at a single location. For example, the portal may provide access to recommendations of the group(s) or cluster(s) associated with the user; with customized news services; with personality-based matchmaking services; personalized radio-station services delivering music associated with the user; bill-  
10   paying services; local events; and other services associated with the user and/or the user's group(s).

          The system of the preferred embodiment uses this combination of a personalized portal and intelligent collaborative filtering to provide beneficial features to the users, publishers and advertisers. The user is provided with  
15   personalized services, as discussed above, at a single site, and access to multiple sites without the need for multiple log in procedures and a single clear privacy policy. The content publisher gains access to users having an interest in their content. The advertisers gain premium advertising targeted directly to selected demographics gained through the intelligent collaborative filtering, discussed in  
20   greater detail below.

          The system architecture, as shown in Figure 1, of a preferred embodiment of the present invention provides database 20 containing the user data and recommendations integrated with data suppliers 30. The data suppliers are interconnected to the global network and include the content publishers,  
25   advertisers as well as search engines and websites connected through the global network. Other data sources, such as proprietary data sources are also available through the data suppliers.

          The information from this integration, based in a hosted server 40, is available through the "Front End" server 50 and the "Partner" server 60. The  
30   Front End server provides the user data and recommendations obtained from the User 70, via a browser or other interface and supplied back to the User 70. The Partner server 60 provides access to the User and to the User data and

information to the networked websites (merchants, content publishers, and advertisers). This information is integrated together to provide a transparent, personalized portal to the Users. The information, discussed in greater detail below, from the users to associate the user in one or more groups and stored in database 20. The recommendations are sorted and associated with appropriate groups as well. Also, specific advertising is targeted to relevant groups.

### **Intelligent Collaborative Filtering System**

One unique feature of the present invention is the intelligent collaborative filtering system. This feature is not a true collaborative filtering system as that term has been previously defined to associate users based on histories of purchases and website visits. The feature of the present invention is instead a system of "lifestyle" databases" based on "interviews" with users. This preferred embodiment utilizes these "lifestyle" databases based on "interviews" with users on different topics to create groups of lifestyles of users. These groups are then assigned characteristics based initially on assumptions. These characteristics and assumptions are then iteratively refined until a stable configuration is achieved for the group. The users in each of the groups are more closely associated through these characteristics than the previous clusters based on purchase histories and website visits.

The initial assumption behind this feature is that user preferences, in general, are not merely random to each user. Instead, preferences are relative to lifestyle choices, perhaps even stereotypical. Also, these user preferences may be clustered together to create a "Lifestyle". For example purposes only, an initial assumption is that people who prefer country music also prefer to drive trucks as opposed to sedans. This may be labeled as a "Cowboy" lifestyle. Another example may be that people who buy diapers also tend to buy baby food. This may be labeled "New Parent" lifestyle.

A second assumption behind this feature is that a defined "Lifestyle" is an indicator of the desires of the people associated with that lifestyle. For example, a Cowboy lifestyle may indicate that people associated with that lifestyle prefer country music, Wrangler brand jeans, cowboy boots, cowboy hats, pick-up

trucks, steak restaurants, etc. The Cowboy lifestyle may also indicate that people associated with this lifestyle reject urban music, small sedans, Armani suits, sushi, etc. A "Hip hop" lifestyle on the other hand may indicate that people associated with this lifestyle desire baggy clothes, urban music, sketcher shoes, and reject cowboy boots, traditional art, Wrangler jeans, etc.

A third basic assumption behind the lifestyle feature is that entertainment taste is an indicator of Lifestyle. For example, people associated with the Cowboy lifestyle may choose western movies, John Wayne movies, country/western music, steakhouses, etc. People associated with the Hip hop lifestyle on the other hand may choose urban gangster movies, rap/hip hop music, late night diners, etc.

These assumptions are used to create the Lifestyle databases of groups of users. It is to be expressly understood that other assumptions may be used as well and the present invention is not to be limited to these assumptions. For example, lifestyles may be created from other assumptions, such as geographic regions, i.e., "Southern" lifestyles vs. "Northeastern" or "Southwestern" lifestyles. Also, lifestyles might be based on economic factors, education factors, age, hobbies, professions, etc. Indicators can also be derived from factors other than entertainment. For example, sports, activities, hobbies, etc. could be used as indicators of lifestyles. The above assumptions were provided for explanatory purposes only in the descriptive embodiment. Any assumption that discloses and utilizes preferences based on general assumptions or characteristics of users can be utilized under the present invention.

The preferred embodiment of the present invention utilizes such assumptions about users to create lifestyles that are able to provide useful recommendations to users. In this preferred embodiment, the lifestyle system first identifies "Objects". These Objects include indicators discussed above. For example, in a preferred descriptive embodiment, Objects may include movies, albums, artists, books, clothing, restaurants, songs, and the like that indicate the lifestyle preferences of the user. Each Object includes properties associated with that Object. For example, a movie Object may have the properties of genre, actor, year released, director, etc.

These Object properties are clustered to create Lifestyles. In the preferred embodiment, this step is accomplished by obtaining property ratings as an average of the rating of all objects that have that property. The system then determines how each of the properties are linked together by how closely the properties are related. Clusters of highly linked properties are then created. This may be done through the use of hierarchical linking, that is, by "walking the web" or following the linkage of the properties graphically. For example, Objects, such as movies, art, books, etc. having the property of having a "western" genre may be clustered into a "Cowboy" lifestyle due to the western genre being highly linked in each of the objects.

Next, the system "interviews" the user by asking questions of the user to find out the user property ratings. For example, the user may be queried to rate actors, genre, directors, etc. In the preferred embodiment, a new user is queried to rate a random set of Objects. The system then determines from the rated Objects which properties have been rated. The new user is then asked to select objects to determine the relevant properties of the earlier rated Objects. The user property ratings are then determined from the Object ratings.

These ratings are sorted to determine the Lifestyle clusters relevant to the user. The user property ratings are compared with previously defined cluster patterns. Each cluster is given a "relevance" measure based on how similar the rating patterns are. Then each cluster is rated as the average of all ratings for properties in the cluster. Users are represented as a linear combination of clusters:  $\text{Sum}_{(\text{all clusters } C_i)}(\text{relevance}_i)(\text{rating}_i)(C_i)$ .

Finally, based on the relevant Lifestyle clusters, recommendations as to Objects can be made to the user. Objects are placed into clusters depending on their properties. User-specific cluster weighted ratings are applied to all objects in each cluster. Each object is then determined to be the weighted average of ratings for all clusters that the contain the object. If the weighted average is high enough, then the object is recommend to the user.

In an example of the lifestyle system, the system has previously created lifestyle clusters based on the assumptions described above. A new user is queried on random sets of Objects. The user may be asked to rate their

preference for genres of movies, restaurants, clothes, music, etc. In this example, the user rates certain movies, restaurants, clothes, music above other movies, restaurants, clothes and movies. The system then determines that the rated objects have certain properties that have been previously rated. The user is then asked to rate other objects that are closely linked through properties linked to the previously rated objects. The user property ratings are then assigned to the user based on the results of these interviews. Lifestyle clusters or groups are then assigned to the user based on the determined user property ratings compared with previously defined cluster patterns. In this example, the user may have selected objects such as western movies, steakhouses, trucks, Wrangler jeans, rural settings. The system then determined that these objects have closely linked properties that are associated with the "Cowboy" lifestyle. The lifestyle system then makes recommendations to the user based on weighted ratings received from other users associated with the Cowboy lifestyle.

It is to be expressly understood that other processes can be used to determine the Lifestyle cluster associated with the users. It is also to be expressly understood that these Lifestyle clusters can also be used for other uses other than making recommendations. Specifically, the Lifestyle clusters are also usable for determining demographics of users and/or buying preferences. This information is particularly useful for targeting advertising specifically tailored for those demographics.

### **Implementation of Lifestyle System**

A specific implementation of the Lifestyle System is illustrated in Figure 2. It is to be expressly understood that other implementations are also within the scope of the present invention. The system 100 includes a server 110 connected to database 120 containing individual primary data obtained from user preferences and other sources. The server 100 is also connected to database 130 containing personalized individual recommendations database and connected to People Categorization module 140. The module 140 is also connected to the Individual Primary Database 120 and to database 150 containing person-lifestyle classification information. This database 150 is in turn connected to the

Recommendations module 160 which is connected to the Personalized Individual Recommendations database 130. The People Categorization Module receives input from the Individual Primary Database 120 and from the Lifestyle Clusters Database 170. The Lifestyle Clusters Database 170 exchanges information with the Lifestyle Finder Module 180 and transmits information to the People Categorization Module 140, to the Recommendations module 160 and to the Object Categorization module 190. The Lifestyle Finder Module 180 receives information from the Individual Primary Database 120 and from the Objects and Characteristics Database 200. The Object Categorization Module also receives information from Object Interface 210. This information is exchanged in eXtensible Markup Language, although other languages can be used as well.

As illustrated in Figure 2, the necessary information is processed between the relevant databases and modules to create the Lifestyles and to process recommendations. It is to be expressly understood that other implementation this system are included under the claimed inventions.

#### **Example of Lifestyle System**

An example of a browser based Lifestyle system is illustrated in Figures 3 – 9. As shown in Figure 3, the user is requested to log in to the system. In a preferred embodiment, not shown, this log-in would be accessible on a personalized portal page that contains personalized information for the user, as discussed above. Once the user logs-in, or if a new user, then creates a system identity and password. The user can then access different menus, as shown in Figure 4, such as Movies, Restaurants, Clothes, or Options. Clicking on the Movies tab causes the Movies menu to be displayed, as shown in Figure 5. The user is then able to rate different movies, view how others in the associated lifestyle have rated movies, and see other information about the lifestyle group. Similar menus are available for the Restaurants and Clothes.

If the user has not yet been associated with a Lifestyle, then the system interviews the user by asking for ratings on random Objects. Once the system has sufficient confidence that the user belongs to a Lifestyle, then the user is associated with that Lifestyle. Users can also belong to more than one Lifestyle.

The user is able to view their associated Lifestyles and the confidence rating assigned to that Lifestyle by clicking on the Options Menu, then the Lifestyles link. The associated Lifestyles and confidence ratings are then displayed, as shown in Figure 9.

5           The user is also able to alter their profile and to choose Lifestyles as well. All information about the user, in the preferred embodiment, is editable by the user. The user is also allowed to delete information and to reserve the use of the information as well. The system, in the preferred embodiment is designed to allow the user to "opt-in" in order to address any privacy concerns by the user.

10           It is to be expressly understood that all descriptions of preferred embodiments are provided for explanatory purposes only and is not meant to limit the present invention.

### Claims

1. A method for providing recommendations to users utilizing  
a computer system, said method comprising the steps of:  
5 defining one or more objects;  
determining properties of said defined objects;  
associating said defined objects into clusters;  
associating users with one or more of said clusters; and  
providing recommendations to users based on the association of  
10 users with clusters.

2. The method of claim 1 wherein said step of defining one or more  
objects includes:  
5 defining indicators about the preferences of a user.

3. The method of claim 1 wherein said step of defining one or more  
objects includes:  
5 defining indicators relevant to the preferences of a user.

4. The method of claim 1 wherein said step of determining properties of  
said defined objects includes:  
5 defining information associated with each of said objects.

5. The method of claim 1 wherein said step of associating said defined  
objects into clusters includes:  
5 associating said objects based on the relation of said properties to one  
another.



6. The method of claim 1 wherein said method further includes the step of:

determining a cluster associated with a particular user.

10

7. The method of claim 1 wherein said step of associating clusters to a user includes:

querying the user to determine said properties that are relevant to the user;

associating said determined properties relevant to the user with one or more of said objects; and

5

assigning one or more of said clusters associated with said associated objects.

8. The method of claim 7 wherein said step of associating said determined properties relevant to the user with one or more of said objects includes:

comparing said determined properties relevant to the user with previously defined patterns of said properties relevant to other users.

5

9. The method of claim 7 wherein said step of comparing said determined properties relevant to the user with previously defined patterns on said properties relevant to other users includes:

assigning a relevance measure based on how similar the pattern of said determined properties are within an associated cluster; and

5

weighting each object by said relevance measure to determine how relevant an associated cluster is to the user.

10. The method of claim 9 wherein said step of providing recommendations to users based on the association of users within an associated cluster includes:

weighting said recommendations by said relevance measure.

5

11. The method of claim 1 wherein said method includes:  
a system for implementing said method;  
providing a portal for allowing access by users to said system.

5 12. The method of claim 11 wherein said method further includes:  
providing advertising on said portal based on said objects that are relevant  
to a particular user.

13. The method of claim 11 wherein said method includes:  
providing websites associated with said portal to enable a user to log in a  
single time to gain access to multiple websites.

5 14. The method of claim 1 wherein said method includes:  
providing a client server network for implementing said method.

15. The method of claim 1 wherein said method includes:  
providing a computer-readable medium having executable instructions for  
implementing said method.

16. The method of claim 1 wherein said method includes:  
providing a system for implementing said method;  
said system including:  
5 a first database containing individual primary data relating to the users;  
a second database containing personalized individual recommendations;  
a third database containing data relating to said clusters;  
a fourth database containing data relating to said objects and to said  
properties;  
a people categorization module connected to said first database and said  
10 third database;  
a cluster searching module connected to said third database;  
an object categorization module connected to said first database, said third  
database and said fourth database; and

15 a recommendations module connected to each of said databases and modules.

17. A system for providing recommendations to users; said system comprising:

an interface for allowing users to enter data regarding the user's interests;

a first database for storing said user data;

5 an object categorization module for defining object in accordance with the properties of an object;

a second database for storing data relating to said defined objects;

a cluster module for associating objects into clusters depending on related properties between objects;

10 a third database for storing data relating to said clusters;

a user categorization module for associating users with one or more of said clusters depending on said user data and said properties of associated objects within said clusters;

15 providing recommendations to users depending on said clusters to which a user is associated; and

a fourth database for storing recommendations.

18. The system of claim 17 wherein said system includes:

a server for operating said system.

19. The system of claim 17 wherein said system includes:

a networked system of computers for operating said system.

20. The system of claim 17 wherein said interface includes:

a portal for allowing a user access to said system.

21. The system of claim 17 wherein said system includes:

a portal for allowing a user access to said system; and

advertising on said portal based on information that a user has entered about their interests.

5

22. The system of claim 17 wherein said system includes:  
a portal for allowing a user access to said system; and  
links to associated websites allowing a user access to multiple websites through a single access point.

5

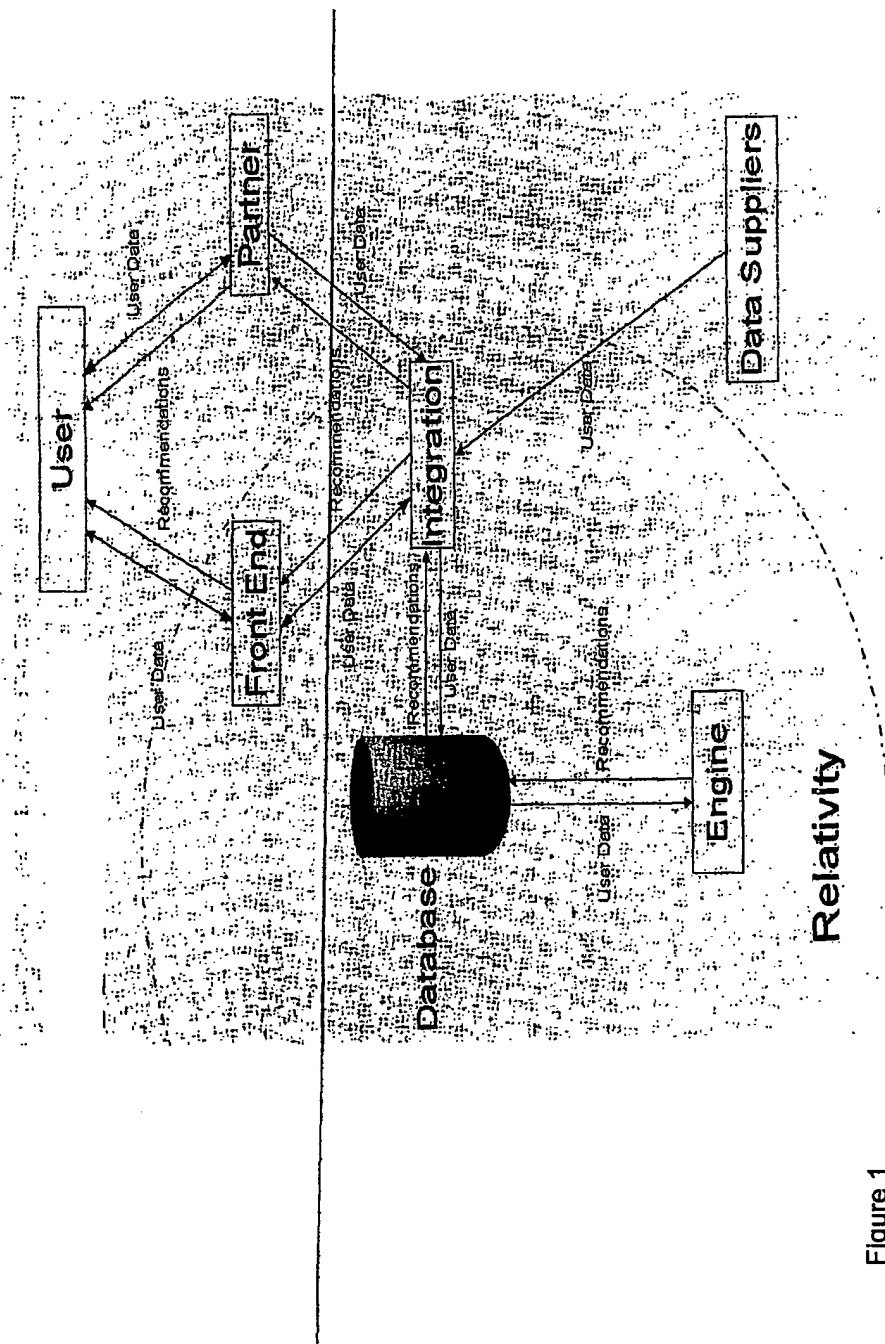


Figure 1

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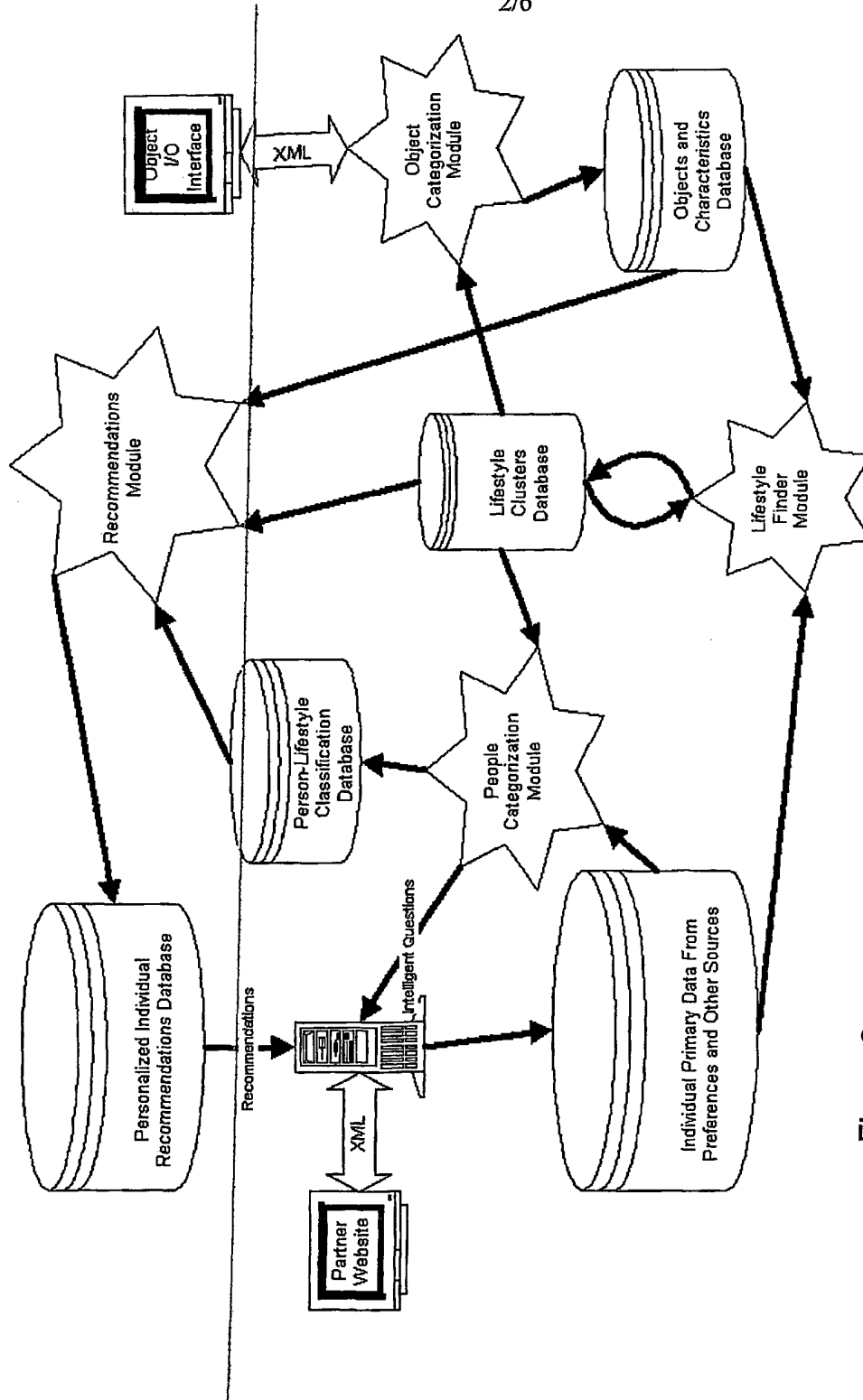


Figure 2

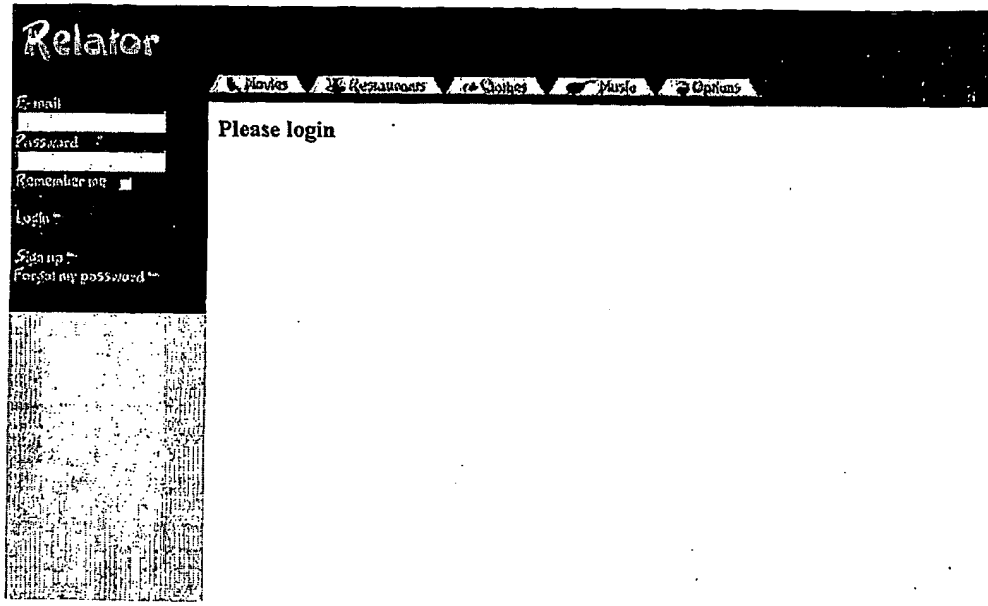


Figure 3

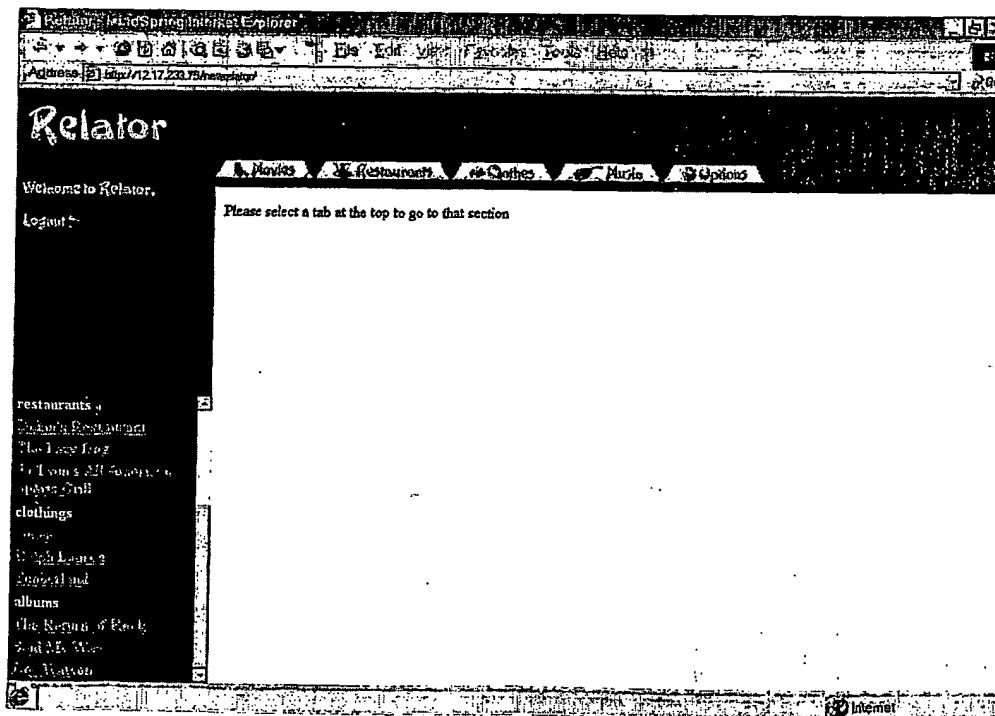


Figure 4

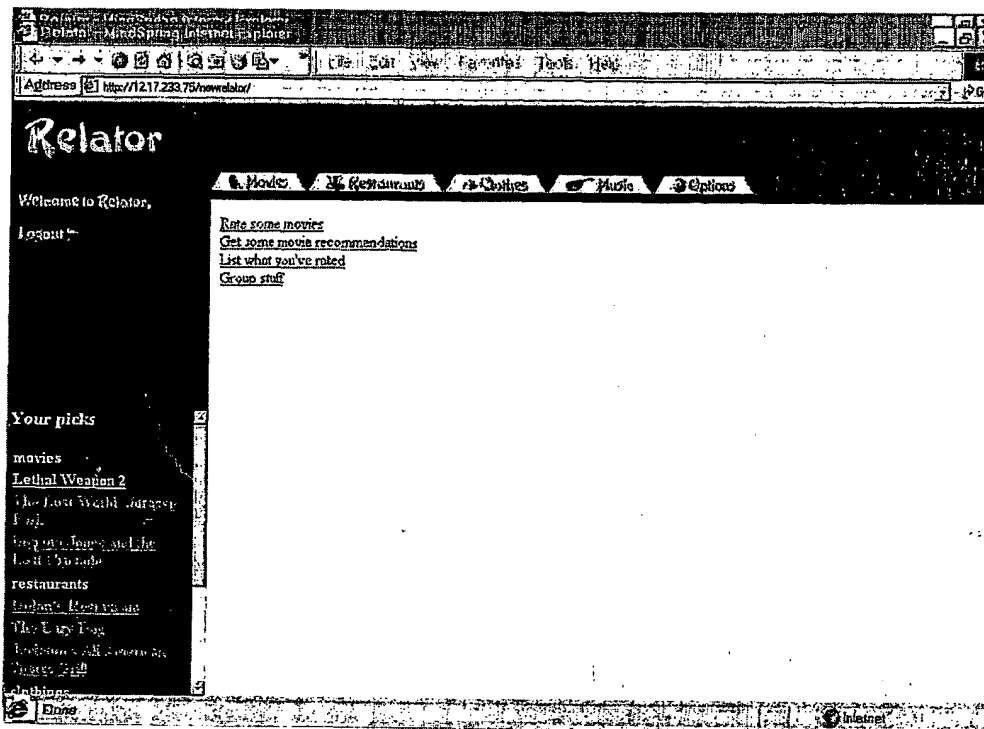


Figure 5

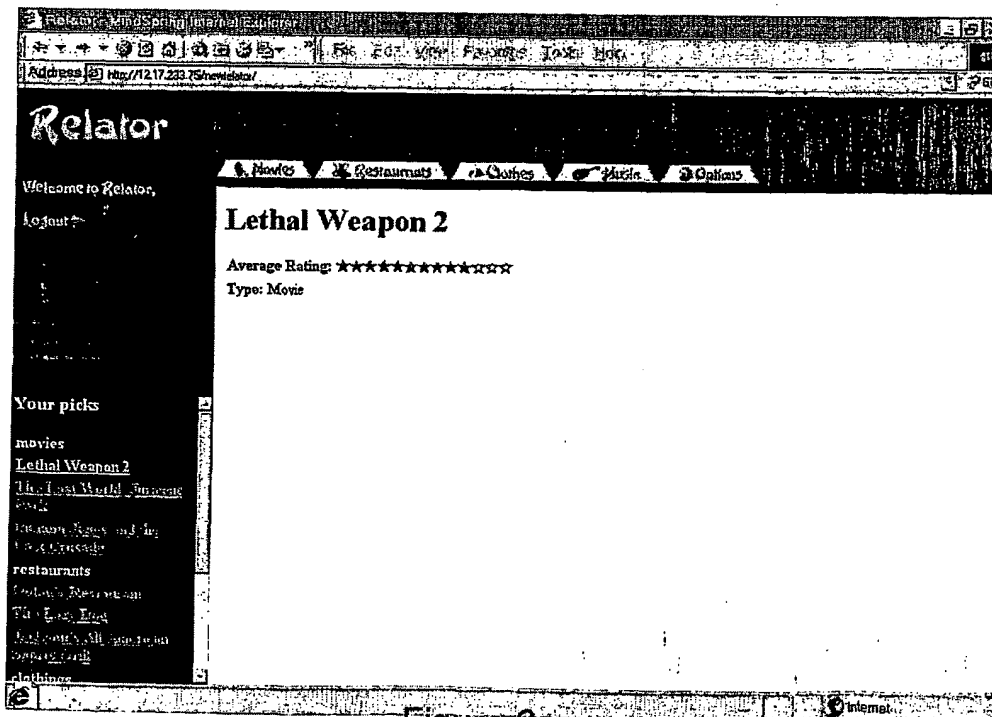


Figure 6



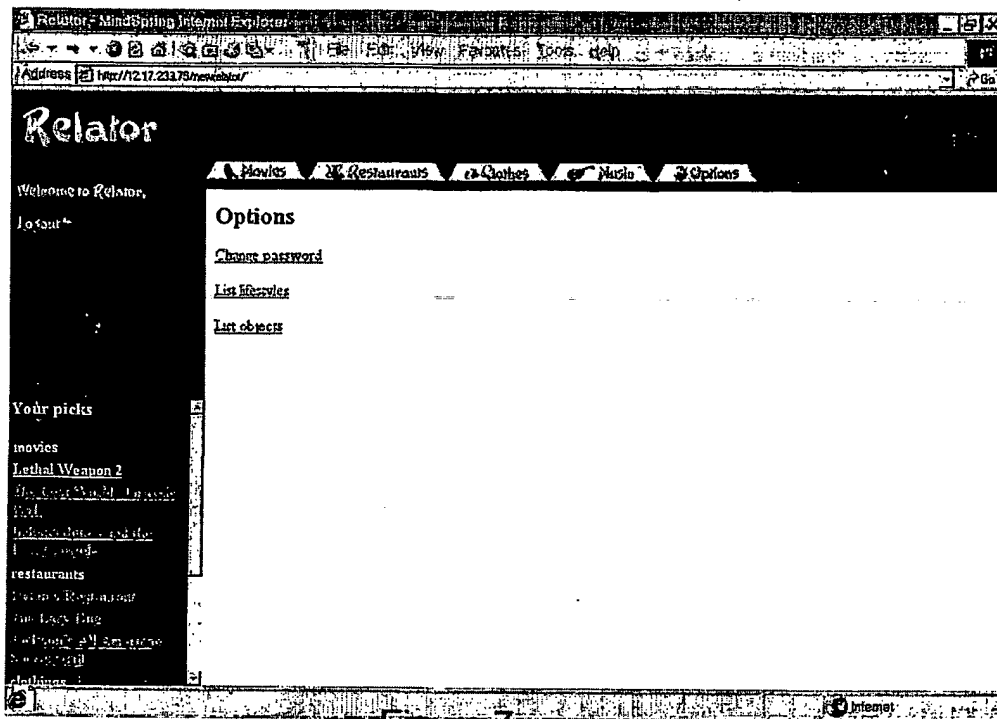


Figure 7

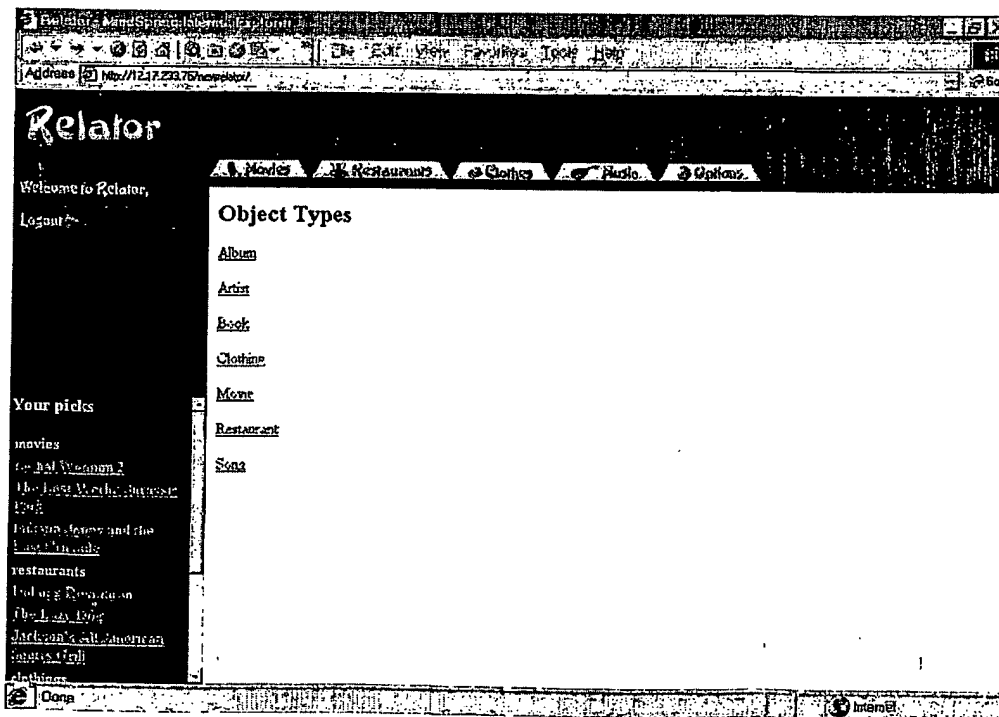


Figure 8

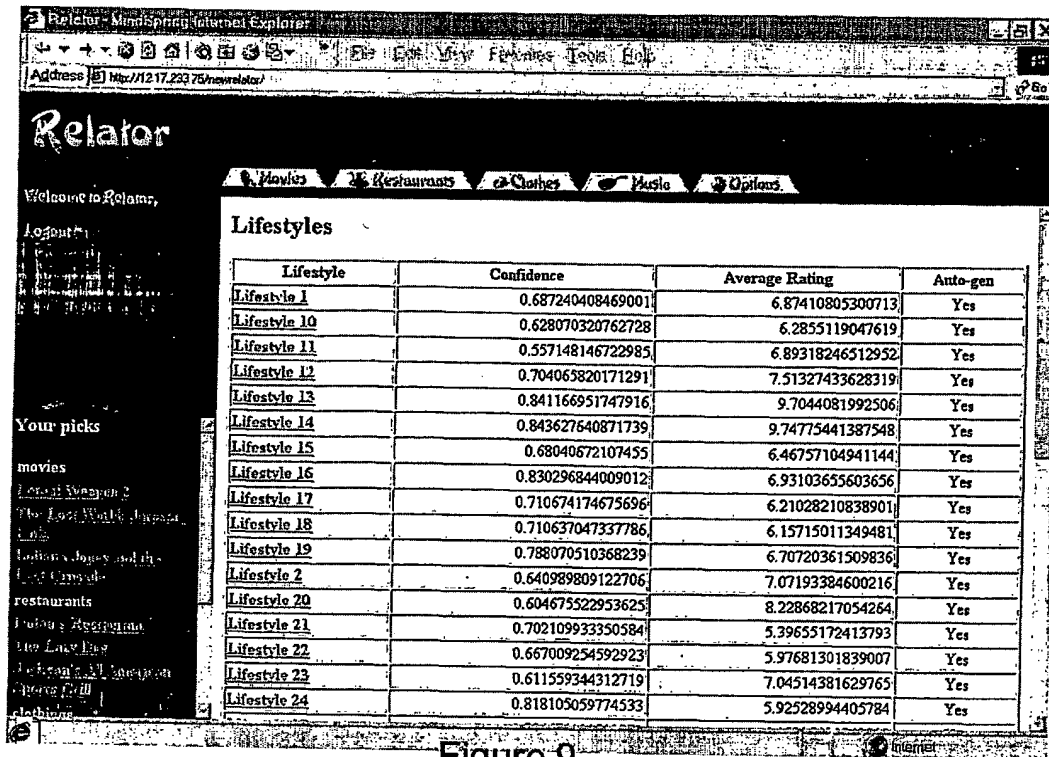


Figure 9

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US01/20689

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G06F 17/30, 17/60

US CL : 707/3; 705/26

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 707/3; 705/26

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
y	US 6,052,681 A (HARVEY) 18 APRIL 2000, col. 9, lines 1-29, col. 8, lines 21-49, col. 6, 1-35, col. 26, lines 34-65, and col. 6, lines 37-col. 7, lines 55.	1-22
Y	US 6,064,979 A (PERKOWSKI) 16 MAY 2000, col. 18, lines 57-61, col. 17, lines 7-15, col. 17, lines 15-23, col. 17, 24-29, col. 17, lines 30-44, and col. 3, lines 18-33)	1-22

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

17 September 2001 (17.09.2001)

Date of mailing of the international search report

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